

STATE OF ALASKA

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ANNUAL REPORT OF PROGRESS, 1960-1961

FEDERAL AID IN FISH RESTORATION PROJECT F-5-R-2

SPORT FISH INVESTIGATIONS OF ALASKA

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Introduction

This report of progress consists of the Job Completion Reports from the State of Alaska's Federal Aid in Fish Restoration Project F-5-R-2, "Sport Fish Investigations of Alaska".

The current Project is composed of eighteen separate studies and were designed to evaluate the various aspects of the State's recreational fisheries resources. The information gathered will provide the necessary background data for the development of future programs. During the current segment continued emphasis was placed on overall inventorying of accessible waters and the evaluation of general catch data.

Several problems of immediate concern appeared sufficiently defined to warrant independent studies. As a result, two independent creel censuses, one experimental silver salmon egg take and a Resurrection Bay area silver salmon population study were instigated. Data accumulated from prior jobs dealing with the Arctic grayling has resulted in the formulation of three separate investigations during the current segment.

The rapid expansion of Alaska's population is being reflected in the ever increasing numbers of "No Trespassing" signs encountered in the vicinity of population centers. Fortunately, much of Alaska's fishing waters are still in the public domain. An aggressive program of acquiring access to fishing waters, instigated in 1959, was continued during the present segment. Increased emphasis is being placed on this job and the successful continuation of this activity, now and in the immediate future, will forestall many of the serious recreational use problems currently facing other states.

The enclosed progress reports are fragmentary in many respects and the interpretations contained therein are subject to re-evaluation as the work progresses.

ANNUAL REPORT OF PROGRESS
INVESTIGATIONS PROJECTS
COMPLETION OF 1960 - 1961 SEGMENT

State: ALASKA

Project No: F-5-R-2

Name: Sport Fish Investigations
of Alaska

Job No: 1-C

Title: Inventory and Cataloging
of the Sport Fish and Sport
Fish Waters in the Cook
Inlet and Copper River
Drainages

Period Covered: July 1, 1960 to May 15, 1961.

Abstract:

Inventory surveys of the waters in the Upper Cook Inlet drainage were started in 1959 (Volume 1, Report No. 1-C, Dingell-Johnson Report, 1959-1960). The present inventory activities were confined to the Matanuska Valley, a portion of the Susitna River drainage and the immediate Anchorage area.

Standard survey techniques were used in assessing the waters under study with emphasis being placed on lakes readily available to the anglers by road.

Information collected on each body of water was tabulated and summarized on standard forms and is available at the Palmer, Anchorage and Juneau offices.

Linear regressions are presented for the surface waters in the area from which total dissolved solids, hardness as HCO_3 and CaCO_3 can be estimated from a measurement of the specific conductance. (Figure 1).

Two lakes were experimentally rehabilitated. One lake was treated with Toxaphene, a chlorinated hydrocarbon compound, and the second lake was treated with Fish Kill-11,

trade name for a synergized rotenone product of the Fairfield Chemical Company. Complete eradication was attempted in both lakes.

Angling pressures were observed to have increased over prior years pointing to the need for more management activity and increased knowledge of the waters to direct these management activities.

Recommendations are presented for the management of 16 lakes and to direct the course of further studies.

Objectives:

To conduct lake and stream surveys and evaluate the extent, the potential and the current use of the waters readily available to the area's anglers.

To determine the relative need for further management investigations and to direct the course of such studies.

To experiment and develop techniques with various fish toxicants for use in experimental rehabilitation and to formulate procedures for future experimental rehabilitation programs.

Introduction:

The Matanuska-Anchorage area in Upper Cook Inlet abounds with countless inland lakes and streams; many of these presently support important sport fish populations. Some lakes and streams lack game fish, while some are barren of all species of fish. It is the purpose of the present investigation to determine and point out those waters where management can best be applied to produce a desirable sport fishery.

Standard lake surveys were conducted from July 1, 1960 to May 15, 1961, and the waters cataloged. These surveys were conducted primarily to learn the basic answers of what species occurred where and in what abundance, land ownership, spawning areas, obstructions to spawning, other uses of the water, accessibility, and an estimate of the surface area and maximum depth. In addition, winter-dissolved oxygen determinations were

made to further assess the water's ability to sustain fish. This information, added to observations on the trend in angling pressures, dictated the final decisions pertaining to the management of the waters under study. All information that could be obtained on the past and present sport fishery was also recorded.

Characteristics of Lakes

Topography:

The area discussed includes the areas east of the Susitna River, to the junction of the Knik and Matanuska Rivers and north to the Talkeetna Mountains. The rugged Chugach Mountains, which rise abruptly from the valley floor to altitudes greater than 6,300 feet, form the southern boundary.

The Matanuska Valley is a wide, flat-floored valley; the local relief generally not being more than 100 to 200 feet above sea level.

The valley floor extending westward from the Matanuska River at Palmer is a gently rolling surface. In much of it the hills and valleys have a southwest trend; this orientation particularly is noticeable in the series of lakes west and northwest of Pittman known as the Meadow Lakes.

A conspicuous belt of hills which rise 50 to 150 feet above the surrounding country extends southwestward past Pittman. A chain of similar hills borders Big Lake on the south, which gradually curves to the southeast, ending at Goose Bay.

The drainage in many interstream tracts is poor due to the irregular topography. There are large areas of swampy ground and shallow lakes occupy many of the hollows.

The Matanuska Valley is quite evenly divided from the Susitna River floodplain by the Little Susitna River which proceeds due north from Cook Inlet and turns abruptly east to the Talkeetna Mountains a little west of Houston. The topography changes abruptly west of the Little Susitna to low, muskeg-swamp terrain covering very large areas with

only a few glacial ridges fingering west and southwest to the Susitna River and Cook Inlet. Actually, the Little Susitna River is part of the Matanuska River as it drains a large part of the Matanuska Valley.

For the most part, the lakes in the Matanuska Valley east of the Little Susitna are situated in the low, flat lands and range in depth from five to 96 feet. With the exception of a few small, scattered ox-bow lakes, glacial action predominantly formed the present lakes by a scouring action, deposition of gravel-moraine ridges and the melting of huge blocks of ice. The most prominent of the moraine-ridge type lakes are the southwest-oriented lakes lying parallel to each other near Houston.

The lakes in the floodplain of the Susitna River to the Little Susitna River have not been as thoroughly investigated as those of the Matanuska Valley, but generally can be considered similar in chemistry, physiography and productivity.

On the basis of productivity, lakes in this region may be compared to sub-alpine lakes. Except for those located in bog type situations, they are clear water lakes, eutrophic in character, with two overturn periods (spring and fall). They have a medium to low thermodynamic cycle, and most contain soft-water holding only small amounts of calcium and magnesium in solution. The average bound carbon dioxide does not exceed five cc. per liter, and the pH range is from 6.5 to 7.25.

Productivity and dissolved solids are considered low for natural lakes. Growth rates for game fish are slow due to poor plankton and bottom-fauna production. This condition is a result of the short duration of warm temperatures and lack of natural nutrients.

Management Problems

A great many of the lakes of the region are landlocked and lack suitable natural spawning areas for trout. Most of the lakes capable of supporting game fish are heavily infested with undesirable fish species. The two most prominent, the fine-scaled sucker and three-spined stickleback, seriously hamper or make hatchery fry plants unfeasible. While management problems are numerous, the

more important ones may be listed in their order of magnitude as follows: (1) To acquire public access where needed; (2) To create fishing in new waters and maintain good production in the fisheries that now exist; (3) To increase production of the small, heavily fished, easily accessible lakes.

An immediate action plan can be undertaken to create fishing in new waters. The countless land locked lakes in the area offer an excellent opportunity for management through rehabilitation and stocking of fry. A program of this type accomplishes two things: (1) New (rehabilitated and stocked) lakes can be made available to the angler each year, thus diverting angling pressure from the more heavily utilized lakes where the catch has been declining; (2) Larger fish can be realized as well as improving angler/success ratios.

Good fishery management calls for staying at least three years ahead of the expected sport fishery. Every indication now points to an ever increasing local population. New roads and state highways are moving ahead in the Matanuska Valley and Susitna River Valley. At present, only a coarse estimate can be hazarded as to the impact of the anticipated population increase on the sport fish resources in these areas. Especially vulnerable are the stocks of anadromous species in the many clear water tributaries of the Susitna River.

Future investigation programs should be directed towards evaluating the hatchery stocking program to answer the following pertinent questions: (1) What is the survival of stocked fry? What percentage survive to the angler's creel? (2) How many fry should be planted on a surface acre of water basis? What species should be stocked? (3) What factors are involved in the mortality and survival of planted fry? How can these factors be manipulated to advantage?

All of the above are basic to the ever-increasing problem of managing our hatchery plants but have received little attention to date.

Techniques

1. Background information from prior studies conducted by the Alaska Department of Fish and Game and U. S. Fish and Wildlife were incorporated in the investigation.

2. The species distribution of fishes, estimates of their comparative abundance, age composition and growth rates were made by test netting with a 125 foot, variable mesh, experimental type gill net.

3. Physical, chemical, and biological characteristics were compiled through standard lake survey techniques. Volumetric surveys were accomplished with the aid of aerial photographs and/or actual surveys for the determination of surface acreage. A recording fathometer was utilized for determination of lake depth configuration. During the winter months, oxygen tests were made by means of a Kemmerer water sampler. The samples were analyzed in the field with a Hach colorimeter; a photo-electric technique which determines the quantity of dissolved oxygen in parts per million. Ph determinations were made with a Hellige pocket comparator. The concentration of total dissolved solids, total alkaline as HCO_3 and hardness as CaCO_3 was determined with a Sola-bridge and dip cell.

4. Lake rehabilitation was performed by use of a K-B boat bailer, connected to a drum of toxicant by Tygon tubing. The toxicant was introduced directly into the outboard motor prop wash. Where necessary, spraying with a rotenone compound was accomplished by a gasoline operated pump and back pump.

Findings

Thorough or partial investigations were conducted on 29 lakes during the investigation period. (Table 1).

Complete volumetric surveys were completed for 12 lakes in preparation for experimental rehabilitation. (Table 2).

Determinations of dissolved oxygen contents for the critical winter periods are presented in Table 3.

Test netting summaries for 37 lakes were tabulated and are available at the Palmer office. The managed or stocked

lakes were test netted once in the spring before the opening day of the season and again in the fall prior to freeze up.

Figure 1 presents graphically the linear regressions from which specific conductance readings of a water sample, from surface waters in the area, can be correlated into total dissolved solids, total alkaline and hardness factors. The curves were determined from laboratory analysis of 12 lakes in the Matanuska Valley-Anchorage Area and the lines fitted by inspection. (Table 4). This type of information may prove useful in future surveys where experimental rehabilitation with Toxaphene is planned, and in streams where electro-fishing is to be used.

Experimental Rehabilitation

Two lakes were experimentally rehabilitated, 29.6-acre Kelley Lake with toxaphene and 22.2-acre Falk Lake with synergized rotenone, (Figures 2 and 3).

Kelley Lake:

Kelley Lake was rehabilitated on June 29, 1960 with Toxaphene at a concentration of .04 ppm to eradicate fine-scaled suckers and three-spined stickleback.

The treatment started at 11:30 AM and was completed at 12:30 PM. At 2:45 PM, numerous suckers and stickleback were observed at the surface dying or in distress.

Live boxes with stickleback and suckers were placed at five, ten, 15 and 20 foot depth intervals to check the rate of dispersion and effectiveness of the toxicant.

Seven days after the introduction of the toxicant, the fish in all live cars were dead. The lake was thermally stratified.

Approximately 111 days following treatment, rainbow and silver salmon fry were placed in the lake in live cars. At the end of one week, all were alive and in good condition. Freeze up prevented a longer testing period. Kelley Lake will be tested with live fish again prior to stocking.

Falk Lake:

Falk Lake was rehabilitated on October 25, 1960, with Fish-Kill 11, a synergized rotenone, at a concentration of 0.75 ppm. The lake was unstratified at the time of treatment.

The operation was started at 11:00 AM and completed at 2:00 PM. Stickleback were observed in distress and dying by 2:00 PM. No rainbow trout were found; Falk Lake had been stocked with rainbow fry every year since 1955.

Two days later, on October 27, two rainbow were recovered, one nine inches and one 14 inches long.

Falk Lake froze over completely on October 30.

Live car testing will be performed prior to stocking. Test netting will be carried out to verify the results of the rehabilitation.

Recommendations:

Lakes investigated and found having little or no current value to feasible fish management practices:

June Lake
Patricia Lake
Lalen Lake

Lakes investigated and found to have no possibility of obtaining public service sites in the near future:

Visnaw Lake	Rainbow Lake
Frog Lake	Seymour Lake
School Lake	Long Lake (Willow Area)
Twin Lake	

Lakes investigated and found barren of all fish species; they are recommended for experimental stocking since they appear suitable for rearing salmonoids:

Rush Lake
Bench Lake

Lakes investigated and recommended for rehabilitation and stocking:

Baptist Lake	Florence Lake
Beaver Lake	Gregory Lake
Bumblebee Lake	Jean Lake
Canoe Lake	Loon Lake
Clunie Lake	Morvro Lake
Crystal Lake	Triangle Lake
Drill Lake	Willow Lake
Finger Lake	Zero Lake

It is recommended that future investigations be initiated as follows: (1) Cataloging and inventory activities be continued in the Matanuska Valley drainage and be extended in the Susitna River drainage; (2) A population survey of the king salmon stocks in the Susitna River drainage be initiated as soon as possible; (3) An investigation be initiated to evaluate the factors influencing the survival of hatchery stocked fish and to formulate methods to manipulate these factors advantageously; (4) Experimental rehabilitation be continued and its place as a tool in sport fish management be fully evaluated.

Table 1. Lakes that Received Partial or Complete Surveys, 1960-1961.

NAME	LOCATION
Baptist Lake	T 18N, R 2W, Sec. 35
Bench Lake	Long. 147° 55'W, Lat. 61° 47'N
Beverly Lake	T 18N, R 2W, Sec. 26-35
Bladgett Lake	T 17N, R 2W, Sec. 8
Canoe Lake	T 17N, R 1E, Sec. 13
Caribou Lake	Long. 147' 13"W, Lat. 61° 47'N
Cottonwood Lake	T 17N, R 1E, Sec. 17-18
Crystal Lake	Long. 150° 06"W, Lat. 61° 42"N
Drill Lake	T 20N, R 5E, Sec. 27-26
Fish Lake	T 20N, R 5E, Sec. 33
Frog Lake	T 18N, R 2W, Sec. 30-31
Jean Lake	T 19N, R 4W, Sec. 19
June Lake	T 18N, R 2W, Sec. 23-24
Lalen Lake	T 18N, R 2W, Sec. 32
Long Lake	T 17N, R 3W, Sec. 11
Long Lake	Long. 150' 05", Lat. 61° 43'
Loon Lake	T 18N, R 3W, Sec. 36-2
Lynn Lake	T 19N, R 4W, Sec. 29
Memory Lake	T 18N, R 1W, Sec. <u>22/23</u> 27/26
Morvro Lake	T 18N, R 3W, Sec. 34-35
Patricia Lake	T 18N, R 3W, Sec. 26-35
Prator Lake	T 18N, R 3W, Sec. 25
Rainbow Lake	T 17N, R 2W, Sec. 3
School Lake	T 18N, R 3W, Sec. 36
Seymour Lake	T 18N, R 2W, Sec. 32
Triangle Lake	T 1E, R 17N, Sec. <u>14/13</u> 23
Twin Lake	T 17N, R 3W, Sec. 11
Vishaw Lake	T 18N, R 2W, Sec. 29
Wolverine Lake	T 18N, R 3E, Sec. 7-8

Table 2. Completed Volumetric Surveys to May 15, 1961.

Lake	Surface Area (Acres)	Mean Depth (Feet)	Volume (Acre Feet)
Kelley Lake	29.6	10.2	303.3
Falk Lake	19.0	16.3	310.0
Finger Lake	437.0	14.7	6,404.9
Clunie Lake	115.0	11.9	1,367.4
Gregory Lake	121.1	6.4	769.9
Loon Lake	137.3	10.4	1,433.0
Florence Lake	54.6	17.6	962.0
Crystal Lake	124.9	11.6	1,445.6
Bumblebee Lake	69.3	12.3	851.8
Willow Lake	106.5	5.7	602.3
Zero Lake	87.2	18.3	1,597.9
Baptist Lake	151.9	12.9	1,953.0
TOTAL	1,444.4 Acres		

Table 3. Lakes Tested for Dissolved Oxygen Content.

Date	Name	Location	Station				Sample		pH
			No.	Depth	Snow	Ice	Depth	O ₂ ppm	
1/25/61	Bench Lake	Long. 147° 55W; Lat. 61° 47' N	1	21'	6"	20"	5' 15'	10.1 6.5	7.25 7.25
3/29/61	Canoe Lake	Sec. 13/ T 17N/ R 1E	1	25'	2"	31"	5' 10'	7.5 4.9	7.5 7.25
1/25/61	Caribou Lake	Long. 147° 13'; Lat. 61° 47' N	1	31'	None	24"	10'	10.0	7.7
3/21/61	Clunie Lake	Sec. 28/33/ T 15N R 2W	1	13'	5.5"	26"	5' 10'	6.9 3.4	7.25 7.0
3/22/61	Crystal Lake		1	21'	8.5"	25.5"	5' 10'	10.8 7.1	6.75 6.25
3/29/61	Drill Lake	Sec. 27-26/ T 20N/ R 5E	1	25'	0	28"	5' 10'	5.6 8.0	7.5 7.25
3/21/61	Gregory Lake	Sec. 22/ T 14N/ R 3W	1	11'	5"	27"	5' 10'	6.5 4.8	7.25 7.0
3/22/61	Jean Lake	Sec. 19/ T 19N/ R 4W	1	18.0'	8.5"	26.5"	5' 10'	7.0 6.8	6.25 6.5

Table 3. (Continued) Lakes Tested for Dissolved Oxygen Content.

Date	Name	Location	Station		Snow	Ice	Sample		O ₂ ppm	pH
			No.	Depth			Depth			
1/29/61	Loon Lake	Sec. 36-2/ T 18N/ R 3W	1	13'	None	24"	5' 10'	8.5 7.4	6.6 6.6	
3/28/61	Memory Lake	<u>22/23</u> Sec. 27/26/ T 18N/ R 1W	1	15'	0.5"	30"	5' 10'	7.2 6.2	6.25 6.5	
3/28/61	Morvro Lake	Sec. 34-34/ T 18N/ R 3W	1	14'	4"	29.5"	5' 10'	10.4 6.3	6.25 6.25	
3/28/61	Prator Lake	Sec. 25/ T 18N/ R 3W	1	16'	5"	28"	5' 10'	9.9 5.5	7.0 6.25	
1/25/61	Rush Lake	<u>7</u> Sec. 13/18/ T 20N/ R 7E	1	10'	0	30"	5' 10'	6.8 4.3	6.75 6.75	
3/22/61	Willow Lake	<u>7/8</u> Sec. 18/17/ T 19N/ R 4W	1	12.0'	8.5"	28.5"	5' 10'	3.3 2.3	6.25 6.0	
1/29/61	Zero Lake	Sec. 15-16/ T 18N/ R 3W	1	22'	0	24"	5' 10'	9.4 8.2	7.25 7.25	
3/28/61	Loon Lake	Sec. 36-2/ T 18N/ R 3W	1	13'	5"	28"	5' 10'	7.4 5.9	6.25 6.25	

Table 4.

Source	Specific Condition	Parts per million			pH
		Dissolved Solids	Alk. as HCO_3	Hardness as CaCO_3	
Crystal Lake	13	13	5	4	6.3
Willow Lake	65	50	35	30	6.5
Clunie Lake	55	46	30	26	6.9
Baptist Lake	68	45	44	33	7.3
Lynn Lake	77	47	44	35	7.5
Bumblebee Lake	41	30	25	19	7.0
Upper Fire Lake	145	97	78	72	7.4
Loon Lake	12	11	5	6	6.0
Gregory Lake	238	191	142	125	7.8
Zero Lake	26	18	12	10	6.6
Florence Lake	15	9	8	7	6.3
Long Lake (Meadow Creek)	129	77	80	61	7.9

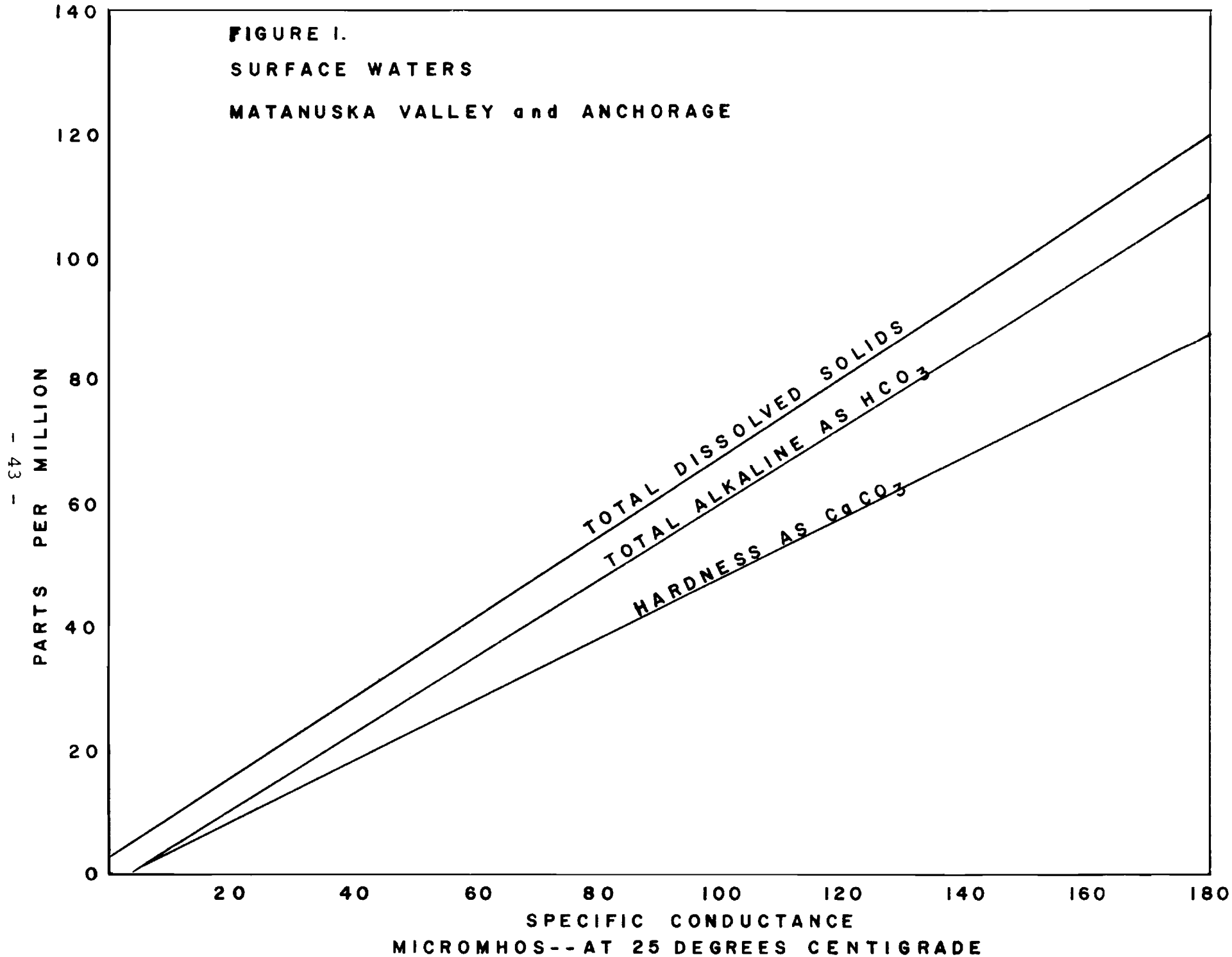
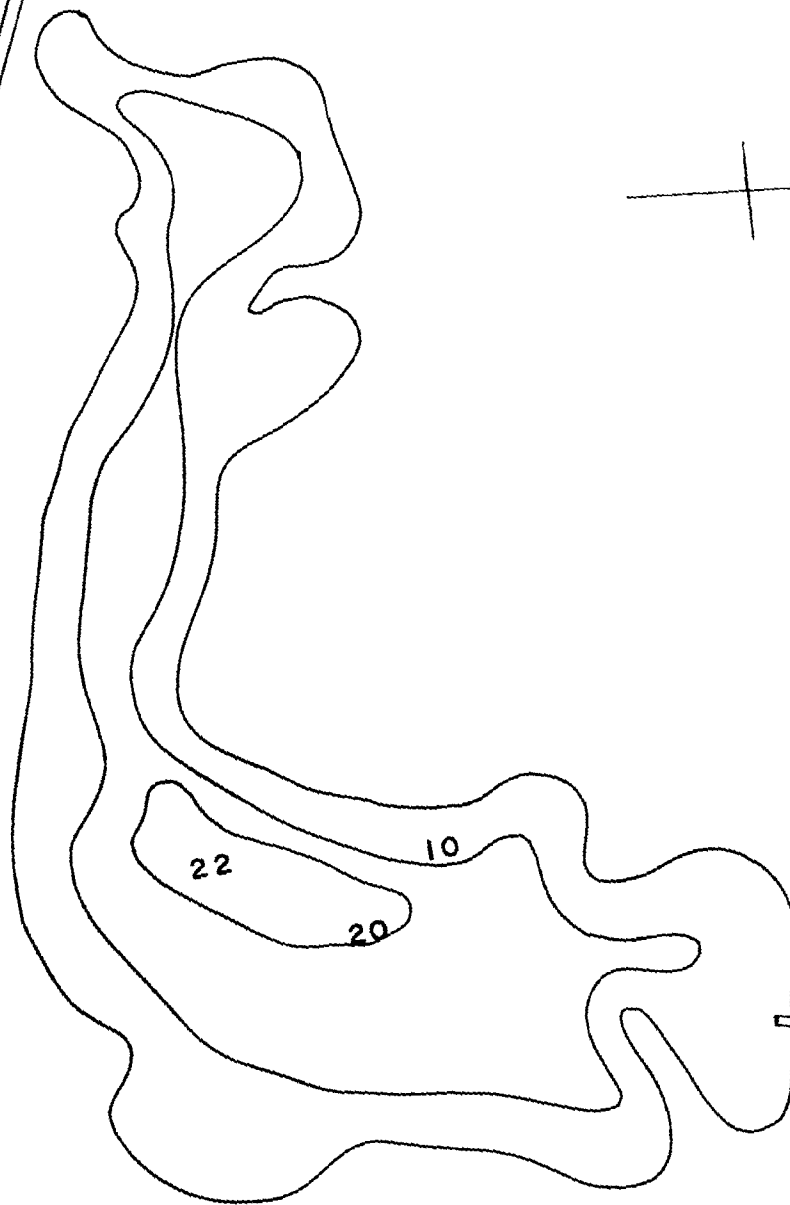


FIGURE 2.
KELLY LAKE
TWP. 19 N, RGE. 4 W, SEC. 28
SURFACE AREA: 29.6 AC.
MEAN DEPTH: 10.2 Feet

WILLOW HWY.



ARR

CULVERT
INLET

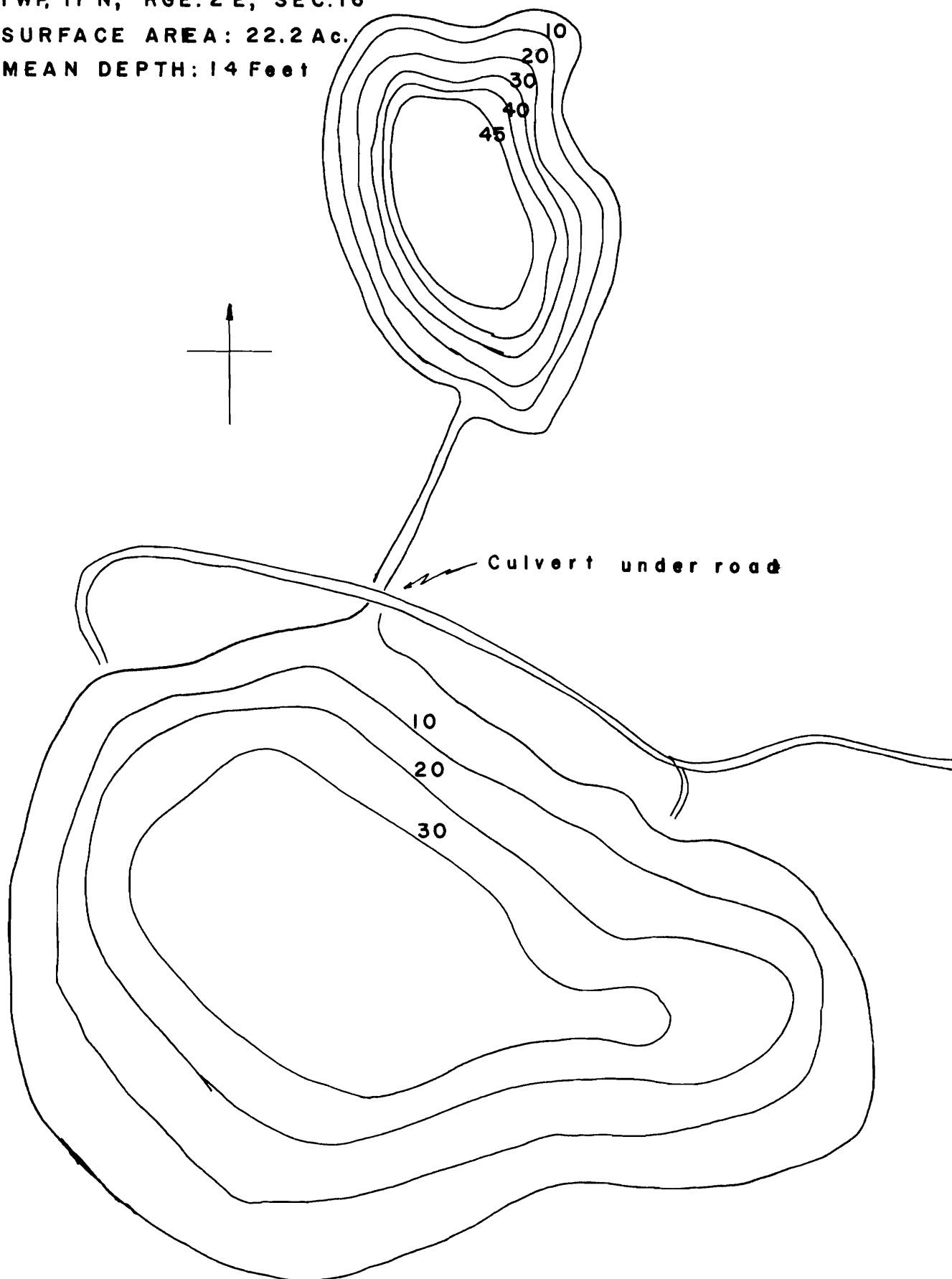
FIGURE 3.

FALK LAKE

TWP. 17 N, RGE. 2 E, SEC. 16

SURFACE AREA: 22.2 Ac.

MEAN DEPTH: 14 Feet



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